

REMARKS

The Office Action mailed on August 1, 2001, has been received and reviewed.

Claims 1-13 are currently pending in the application. Claims 1-13 stand rejected.

Reconsideration of the above-referenced application is respectfully requested.

35 U.S.C. § 101 Double Patenting Rejection

Claims 1-13 stand rejected under 35 U.S.C. § 101 as reciting the same invention as that of claims 1-12 of U.S. Patent 6,121,671 to Ko et al. (hereinafter "Ko").

Claim 1 of Ko recites, "at least one contact aperture defined through said passivation layer and including a substantially vertical sidewall, said at least one contact aperture terminating at said undoped silicon dioxide cap."

In contrast, claim 1 of the above-referenced application recites, "at least one contact aperture defined through said passivation layer and including at least one sidewall extending substantially perpendicularly relative to said semiconductor substrate, at least a portion of said at least one sidewall terminating at said undoped silicon dioxide cap."

While claim 1 of Ko recites that at least one *contact aperture* terminates at an undoped silicon dioxide cap, claim 1 of the above-referenced application recites that *at least a portion of a sidewall* terminates at an undoped silicon dioxide cap.

In addition, claim 1 of Ko recites a substantially vertical sidewall without providing a reference point for the "substantially vertical" orientation, whereas the recitation of claim 1 of the above-referenced application identifies the semiconductor substrate as a point of reference for the "substantially vertical" orientation of the at least one sidewall.

Therefore, it is respectfully submitted that, under 35 U.S.C. § 101, claim 1 of the above-referenced application is allowable over claim 1 of Ko.

Claims 2-5 are each allowable, among other reasons, as depending from claim 1, which is allowable.

Amended independent claim 6 of the above-referenced application recites a semiconductor device that includes at least one undoped silicon dioxide structure and at least one doped silicon dioxide structure over the at least one undoped silicon dioxide structure, “at least a portion of . . . at least one sidewall [of a doped silicon oxide structure] terminating at . . . at least one undoped silicon oxide structure.”

Claim 6 of Ko additionally recites that the at least one undoped silicon dioxide structure is in contact with a conductive structure, an element which is not present in claim 6 of the above-referenced application.

Accordingly, it is respectfully submitted that amended claim 6 of the above-referenced application does not recite identical subject matter to that recited in claim 6 of Ko and, therefore, submitted that amended claim 6 of the above-referenced application is allowable under 35 U.S.C. § 101.

Each of claims 7-13 is allowable, among other reasons, as depending either directly or indirectly from claim 6, which is allowable.

In view of the foregoing, it is respectfully requested that the Office withdraw the 35 U.S.C. § 101 rejections of claims 1-13 as reciting identical subject matter to that recited in claims 1-12 of Ko.

Rejections Under 35 U.S.C. § 102(b)

Claims 1-13 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent 5,275,972 to Ogawa et al. (hereinafter “Ogawa”).

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Ogawa teaches a method for fabricating semiconductor circuits that include with contact windows. In the disclosed method, an isotropic etching process is used to remove a BPSG (a doped silicon dioxide) film 11. This isotropic etching process terminates when the etchant reaches a silicon nitride film 10, which acts as an etch-stop layer, that underlies the BPSG film 11. Col. 8, line 67, to col. 9, line 3. The resulting structure is illustrated in FIG. 1C of Ogawa and includes a doped silicon dioxide structure (BPSG film 10) that terminates at a silicon nitride film 10.

Another anisotropic etching process is then used to expose the surface of the source/drain regions 6 of the underlying semiconductor substrate 2 through the silicon nitride layer 10. Col. 9, lines 45-49. The resulting structure is depicted in FIG. 10D of Ogawa, which shows a contact opening 7 that terminates at a sidewall spacer 5 of a transistor gate.

Ogawa does not depict or describe contact opening 7 as terminating at the upper insulating film 8 of the transistor gate, as has been asserted in the outstanding Office Action. As is well known in the art, the cap of a transistor gate is the insulative structure positioned over the electrode thereof.

As Ogawa describes a structure that includes a contact opening that terminates at a sidewall spacer of a transistor gate rather than at the cap thereof, it is respectfully submitted that Ogawa does not expressly or inherently describe “at least one contact aperture . . . including at least one sidewall . . . terminating at [an] undoped silicon dioxide cap”, as recited in claim 1.

Accordingly, it is respectfully submitted that Ogawa does not anticipate each and every element of claim 1 and that, under 35 U.S.C. § 102(b), claim 1 is allowable over Ogawa.

Each of claims 2-5 is allowable, among other reasons, as depending from claim 1, which is allowable.

Independent claim 6 recites a semiconductor device that includes at least one undoped silicon oxide structure and at least one doped silicon oxide structure over the at least one undoped silicon oxide structure. The at least one doped silicon oxide structure of claim 6 has at least one sidewall that terminates “at said at least one undoped silicon dioxide structure.”

By way of contrast with claim 6, Ogawa lacks any express or inherent description of a doped silicon oxide structure with a sidewall that terminates at an undoped silicon oxide structure. Rather, while Ogawa describes a contact aperture 7 that terminates at a sidewall spacer 5, an undoped silicon oxide structure, the portion of the contact aperture 7 that is defined by BPSG film 9, a doped silicon oxide structure, actually terminates at a silicon nitride film 10 that defines a portion of the surface of the contact aperture 7 located between that formed by the BPSG film 9 and the sidewall spacer 5.

Accordingly, it is respectfully submitted that Ogawa does not anticipate each and every element of independent claim 6 and that, under 35 U.S.C. § 102(b), independent claim 6 is, therefore, allowable over Ogawa.

Each of claims 7-13 is allowable, among other reasons, as depending either directly or indirectly from claim 6, which is allowable.

For these reasons, it is respectfully requested that the 35 U.S.C. § 102(b) rejections of claims 1-13 be withdrawn.

Rejections Under 35 U.S.C. § 103(a)

Claims 1-13 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 5,286,344 to Blalock et al. (hereinafter "Blalock") in view of U.S. Patent 3,886,569 to Basi et al. (hereinafter "Basi").

M.P.E.P. 706.02(j) sets forth the standard for a Section 103(a) rejection:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on

applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (Emphasis added).

The 35 U.S.C. § 103(a) obviousness rejections of claims 1-13 are improper because the prior art references, taken alone or in combination fail to teach or suggest all the claim limitations.

Blalock teaches a structure which includes a semiconductor substrate, a pair of transistor gates positioned on the semiconductor substrate with a conductively doped diffusion region formed in the substrate at a location between the pair of transistor gates. Each transistor gate includes side wall spacers formed from silicon nitride at the side of a conductive element thereof and a silicon nitride cap over the conductive element. A doped silicon oxide layer formed over the transistor gates includes a contact aperture formed therethrough to expose the diffusion region. The sidewalls of the diffusion region are substantially vertically oriented relative to the substrate and terminate at the silicon nitride cap of each of the pair of transistor gates.

Basi teaches a semiconductor device structure in which a doped silicon oxide layer overlies an undoped silicon oxide layer.

It is respectfully submitted that, before the priority date for the above-referenced application, one of ordinary skill in the art would not have been motivated to combine the teachings of Blalock and Basi in the manner that has been asserted in the outstanding Office Action. In particular, neither Blalock, Basi, nor the knowledge that was generally available in the art before the priority date for the above-referenced application provides any motivation to one of ordinary skill in the art to substitute the silicon nitride transistor gate caps of Blalock with undoped silicon oxide. Rather, at page 7, paragraph 6, of the outstanding Office Action, the Office has relied upon a statement that was made in the specification of the above-referenced application to support its assertion that silicon nitride is the equivalent of undoped silicon dioxide. It is respectfully submitted that the Office's reliance upon a statement that was made as a result of the inventive subject matter disclosed in the above-referenced application clearly constitutes improper hindsight, and cannot be used as the basis for asserting that one of ordinary

skill in the art would have been motivated to combine the teachings of Blalock and Basi to render obvious the invention recited in claims 1 and 6 of the above-referenced application.

It is, therefore, respectfully submitted that each of claims 1-13 is allowable under 35 U.S.C. § 103(a) over the combination of Blalock and Basi.

Moreover, it is respectfully submitted that the combination of Blalock and Basi does not teach or suggest each and every element of any of the claims of the above-referenced application.

With respect to independent claim 1, Blalock and Basi, in combination, do not teach or suggest a semiconductor device that comprises a semiconductor substrate including an active device region, at least one conductive line on the active device region and flanked by sidewall spacers, an undoped silicon dioxide cap over and in contact with the at least one conductive line, a passivation layer over the undoped silicon dioxide cap, and at least one contact aperture defined through the passivation layer and including a sidewall that extends substantially perpendicularly relative to the semiconductor substrate, at least a portion of the at least one sidewall terminating at the undoped silicon dioxide cap.

In particular, neither Blalock nor Basi, taken either alone or in combination, teaches or suggests a passivation structure with a sidewall that extends substantially perpendicularly relative to a semiconductor substrate with at least a portion of the sidewall terminating at an undoped silicon dioxide structure. Rather, the sidewall of the contact aperture described in Blalock terminates at a silicon nitride transistor gate cap, while the aperture formed through the doped silicon oxide structure of Basi would terminate at the diffusion region formed in the semiconductor substrate, rather than at a structure comprising undoped silicon dioxide.

Therefore, it is respectfully submitted that, under 35 U.S.C. § 103(a), independent claim 1 is allowable over the combination of Blalock and Basi.

Each of claims 2-5 is allowable, among other reasons, as depending from claim 1, which is allowable.

Independent claim 6 recites a semiconductor device that comprises a semiconductor substrate, at least one undoped silicon oxide structure, and at least one doped silicon oxide

structure over the at least one undoped silicon oxide structure. The at least one doped silicon oxide structure has at least one sidewall oriented substantially perpendicular to a plane of the semiconductor substrate. At least a portion of the at least one sidewall of the at least one doped silicon oxide structure terminates at the at least one undoped silicon oxide structure.

It is respectfully submitted that neither Blalock nor Basi, taken either alone or in combination, teaches or suggests a semiconductor device that comprises a doped silicon oxide structure that includes a sidewall that is oriented substantially perpendicularly relative to a semiconductor substrate, with at least a portion of the sidewall terminating at an underlying undoped silicon oxide structure. Rather, Blalock describes and illustrates a structure with a doped silicon oxide layer that includes a sidewall portion that terminates at a silicon nitride transistor gate cap, while Basi describes and illustrates a structure with a doped silicon oxide layer that would terminate at the surface of a diffusion region formed in an underlying semiconductor substrate.

Therefore, it is respectfully submitted that, under 35 U.S.C. § 103(a), independent claim 6 is allowable over the combination of Blalock and Basi.

Each of claims 7-13 is allowable, among other reasons, as depending either directly or indirectly from claim 6, which is allowable.

Accordingly, it is respectfully requested that the Office withdraw the 35 U.S.C. § 103(a) rejections of claims 1-13.

CONCLUSION

Claims 1-13 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain which might be resolved by a telephone conference, he is respectfully invited to contact Applicants' undersigned attorney.

Respectfully Submitted,



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Enclosure: Version With Markings to Show Changes Made

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

Please amend the claims as follows:

6. (Amended) A semiconductor device, comprising:
- a semiconductor substrate;
- at least one undoped silicon oxide structure[in contact with a conductive structure positioned over said semiconductor substrate]; and
- at least one doped silicon oxide structure over said at least one undoped silicon oxide structure and having at least one sidewall substantially perpendicular to a plane of said semiconductor substrate, at least a portion of said at least one sidewall terminating at said at least one undoped silicon oxide structure.
10. The semiconductor device of claim 6, wherein said at least one undoped silicon oxide structure is at least partially located over [said] a conductive structure.
13. The semiconductor device of claim 6, wherein said at least one undoped silicon oxide structure is at least partially exposed adjacent said at least one sidewall.